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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,587	12/30/2003	Robert Steigerwald	132743/068709-039	8245

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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EXAMINER	
SMITH, JACKSON R	
ART UNIT	PAPER NUMBER
1709	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/748,587	STEIGERWALD ET AL.	
	Examiner	Art Unit	
	Jack Smith	1709	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :12/30/03, 5/13/04, 4/19/06, 4/27/06.

DETAILED ACTION

Claims Analysis

1. It is noted that claims 1 - 10 are recited as a "system" which does not clearly set forth to which statutory category the invention belongs. It has been determined that the claims are directed to an apparatus and the appropriate principles for interpreting claims for that particular category of invention have been applied.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As to claim 5, which object is meant to be referenced by the adjective in the phrase "respective filter" is unclear. In order to examine the claim on its merits, the phrase quoted in the previous sentence has been interpreted to mean that two filters are attached to each of the two "legs" of the apparatus described in claim 1.

As to claim 10, the claim refers to a photovoltaic array that "comprises a single source." In this context, the use of the term source is unclear. In order to examine the claim on its merits, the phrase quoted in the previous sentence has been interpreted to mean that there the photovoltaic array consists of a single

solar panel. This is consistent with the use of the phrase "photovoltaic sources" in paragraph 005 of the specification section of the instant patent application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1, 2 and 5 - 7 are rejected under 35 U.S.C. 102(e) as being anticipated by West et al. (US Patent 7,099,169 B2).

As to claim 1, West discloses a transformerless photovoltaic system in Figure 1 comprising: a bipolar photovoltaic array (photovoltaic array, 30) a full-bridge inverter (as part of the "DC to AC converter," 50) electrically coupled to said bipolar photovoltaic array, said full bridge inverter comprising first and second legs (first leg is the upper half of the DC inverter, containing freewheeling

diodes 15 and 16, while the second leg is the lower half that contains freewheeling diodes 20 and 21) arranged to energize at least two phases of a grid (utility grid, 60) electrically coupled to said photovoltaic system, wherein switching signals applied to switching devices (IGBT switches, 13, 14, 18 and 19) in each of said first and second legs have the capability to be adjusted relative to one other to reduce ripple current therein.

As to claim 2, the two switching devices (i.e., IGBTs 13 and 14 for the first leg and ., IGBTs 18 and 19 for the second leg) in each leg of the full bridge inverter of West et al. are arranged in a series circuit.

As to claim 5, photovoltaic system of West et al. further comprises two filters (the dual "2-pole filters" described in column 2, lines 11-14) each comprising a capacitor and an inductor (capacitor-inductor pairs: 24-22 and 25-23). Each of these filters is coupled to one of the legs of the full-bridge inverter (DC to AC converter, 50) and removes ripple currents therein.

Claim 6 discloses a manner of operating the switching devices of 5 without disclosing any additional structural features to either the switching devices or to the photovoltaic apparatus of which they are a part. Therefore, the claim continues to read on the device of West et al.. The manner of operating a device does not differentiate an apparatus claim from the prior art. A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structure limitations of the claim. See MPEP 2114.

Claim 7 discloses a power output range as a manner of operating the photovoltaic apparatus of claim 1 without disclosing any additional structural features to said photovoltaic apparatus. Therefore, the claim continues to read on the device of West et al.. The manner of operating a device does not differentiate an apparatus claim from the prior art. A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structure limitations of the claim. See MPEP 2114.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 3 and 4 are rejected under 35 U.S.C. 102(e) as being anticipated by West et al. (US Patent 7,099,169 B2) in view of Mori et al. (US Patent 5,459,655).

As to claim 3, the reference West el al. discloses all the features of claim 1 above. West et al. fails to teach that the first and second legs of the inverter comprise first and second pairs of switching devices in a respective series circuit.

Mori et al. teaches an inverter device (neutral-point clamped inverter, Figure 1) whose purpose is to perform a conversion of AC to DC power in order

to supply the former to a motor (far right of figure). As Mori instructs in column 1 lines 9-13, this configuration is especially suited to reduce noise and improve reliability over that of conventional inverter configurations in a similar power conversion scheme. In the case of two phases of AC output, the inverter of Mori contains a first and second leg or "arm" (column 2, lines 5-7) composed of a series circuit of switching devices that may be insulated gate bipolar transistors (column 2, lines 27-29). The first and second legs of Mori et al. each comprise first and second pairs of switching devices (switching devices S11-S14 for the first leg and S21-S24 for the second) in respective series circuit and a respective pair of clamping diodes (Dc11 and Dc12 for the first leg and Dc21 and Dc22 for the second). The manner in which said clamping diodes are coupled to each pair of switching devices, as shown in Figure 1, ensures that neither of the pairs of switching devices carries more than the voltage between the first and second input DC input terminals (T1 and T2, respectively) and the terminal at an intermediate potential (T3). Then, connecting the inverter of Mori et al. to the bi-polar photovoltaic array of West et al. such that the positive terminal of the latter (2 in Figure 1 of West) is connected to the first input terminal of Mori et al. (T1) and the negative terminal of the latter (3 in Figure 1 of West) is connected to the second input terminal of Mori et al. (T2) and grounding the intermediate terminal of Mori et al. (T3) would ensure that none of said first and second pairs of switching devices carries more than a voltage generated by any one photovoltaic sources that comprise the bipolar array. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the inverter of Mori

to the transformerless photovoltaic system of West in order to reduce noise and improve reliability.

As to claim 4, that said first and second pairs of switching devices of Mori et al. comprise switching devices that have relatively lower voltage ratings, as compared to inverter legs comprising two switching devices in series circuit. This is ensured by the configuration of the inverter legs shown in Figure 1.

7. Claims 8 -10 are rejected under 35 U.S.C. 102(e) as being anticipated by Steigerwald (US Patent 4,424,557) in view of Wang et al. (US Patent 6,330,170 B1).

As to claim 8, Steigerwald discloses a photovoltaic system in Figure 1 comprising: a photovoltaic array (solar array, 11); and a full-bridge inverter (full bridge current-controlled inverter, 1) electrically coupled to said photovoltaic array, said full bridge inverter comprising first and second legs (the interverter's first leg comprises bipolar NPN transistors 3 and 7 as well as diodes 17 and 21, while the second leg comprises transistors 5 and 9 and diodes 19 and 23) arranged to energize at least two phases of a grid, via two connections to the "utility grid" shown in the upper right portion of the figure, electrically coupled to said photovoltaic system. However, Steigerwald fails to include a filter for removing ripple current that is present in the second leg, said filter comprising a respective inductor in series circuit in each inverter leg and a common capacitor in a parallel circuit between said inverter legs.

Wang et al. teaches adding a filter ("passive filter", 68) for a bi-directional inverter (Figure 5) that may be used in photovoltaic applications

(column 1, lines 21-24). Said filter is used to join two legs (designated by "e" and "f", respectively, in Figure 5) of a full-bridge inverter ("Bridge II", 58). Said filter comprises two inductors (Lo), each of which is in series with each inverter leg and a common capacitor (unlabeled) in a parallel circuit between said inverter legs. As explained by Wang et al. in Column 4, lines 31-33, the purpose of said filter is to smooth out voltage ripple at the output. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the filter of Wang et al. to the inverter of Steigerwald in order to remove the ripple current.

As to claim 9, the photovoltaic array of Steigerwald is electrically floating (solar array 1, Figure 1). Although not explicitly mentioned in the reference, one skilled in the art would know that the neutral of the grid may be electrically grounded.

As to claim 10, the photovoltaic array of Steigerwald comprises a single source (i.e., "photovoltaic source") in that it may consist of a single solar panel (as illustrated in Figure 1).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Smith whose telephone number is (571) 272-9814. The examiner can normally be reached on 7:30 a.m. - 5:00 p.m., Mon - Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-9827. The fax

phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JRS

ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER